Reflective Optoswitch

Arrow Retro with Flying Leads

VTR17D1

PRODUCT DESCRIPTION

This series of reflective optical switches combines an infrared emitting diode (IRED) with an NPN phototransistor (VTR17D1) in a one piece, sealed, IR transmitting plastic case. The sealed construction improves resistance to moisture and debris. Units have 12", #26 AWG leads. Refer to VTR16xx for devices with PC. board mounting leads.

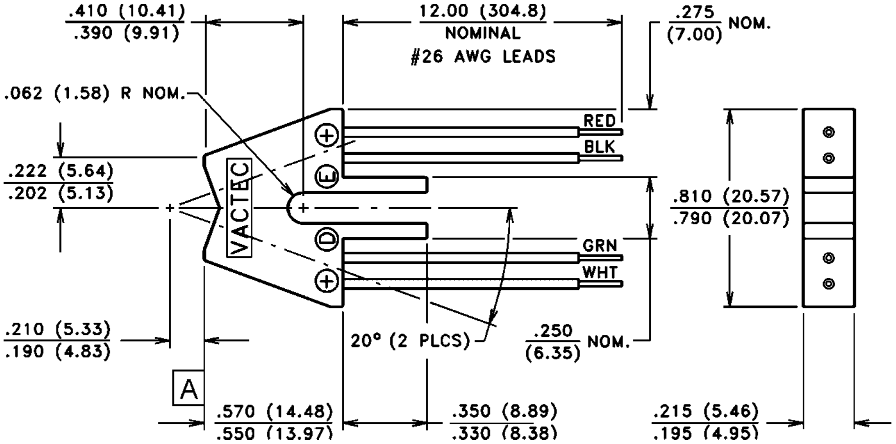
ABSOLUTE MAXIMUM RATINGS

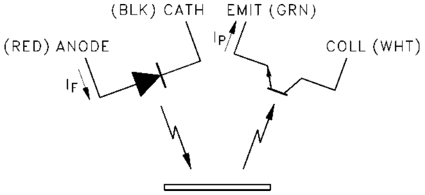
Maximum Temperatures	
Storage and Operating:	-40°C to 85°C
Operating Temperature:	-40°C to 85°C

GENERAL CHARACTERISTICS (@ 25°C unless otherwise noted)

Parameter	Symbol	Text Conditions	Input IRED	Output Detector
Reverse Voltage	V_R	I_R = 100 µA	2.0V Min.	
Continuous Forward Current	I_F	Derate 0.73 mA/°C above 30°C	40 mA Max.	
Forward Voltage Drop	V_F	I_F = 20 mA	1.8V Max.	
Collector Breakdown Voltage	$V_{BR(CEO)}$	I_C = 100 µA		30V Min.
Emitter Breakdown Voltage	$V_{BR(ECO)}$	I_E = 100 µA		5.0V Min.
Power Dissipation	P_D	Derate 0.91 mW/°C above 30°C		50 mW Max.

PACKAGE DIMENSIONS inch (mm)





VTR17D SCHEMATIC

ELECTRO-OPTICAL CHARACTERISTICS @ 25°C (See also curves, pages 20-22)

PART NO. (1) (5)	**LIGHT CURRENT, I_P (2)**				**DARK CURRENT (3) (4)**			**OUTPUT ELEMENT DETECTOR DEVICE**
	mA Min.	Test Conditions			µA Max.	Test Conditions		
		I_F mA	V_{CE} Volts	d inches (mm)		I_F mA	V_{CE} Volts	
VTR17D1	0.3	20	5	0.10 (2.5)	0.1	0	5	PHOTOTRANSISTOR

Notes:

1. The case material is polysulfone and should be cleaned with alcohol or freon TF only. Avoid chlorinated hydrocarbons and solvents such as acetone or toluene, as damage may result.
2. The light current is measured using a 90% reflective surface at the specified distance from Ref. A (refer to Package Dimension Outline on previous page).
3. The dark current is measured with the part totally shielded from ambient light. With 2150 lux (200 fc) from a cool white fluorescent lamp perpendicular to the sensing axis, the detector current will be typically 3 µA for VTR17D1. The same illumination concentric to the sensing axis will result in a detector current of 50 µA for VTR17D1. Equivalent light from an incandescent lamp will result in significantly greater currents.
4. With the specified IRED forward current and no reflecting surface, the crosstalk is typically less than 3 µA for VTR17D1.
5. VTR17D1 accommodates most applications.

Standard Reflective Optoswitches

Notes On Using Reflective Switches

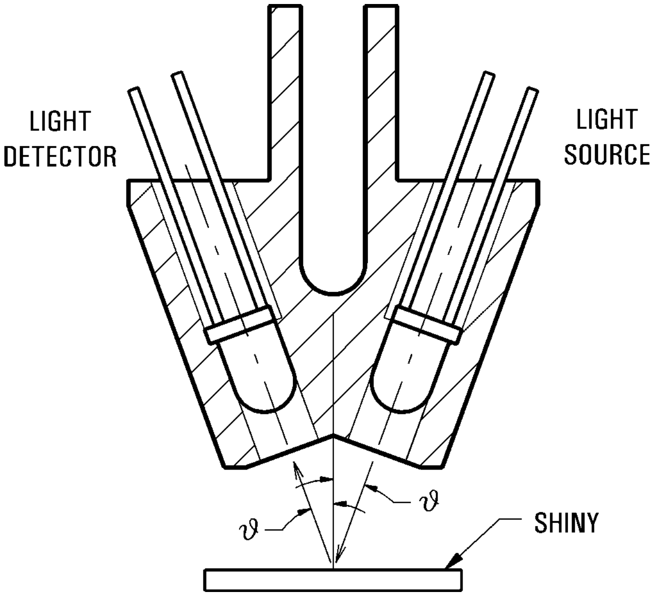
In its most basic form, a reflective optical switch (retro) consists of a housing which holds both a light source and a detector. Light from the lamp of LED radiates outward and is reflected back should an object be placed in front of the switch. The reflected light is sensed by the photodetector whose output signal changes accordingly.

There are a number of different types of reflective sensors. Designs vary depending upon the application. All have certain characteristics in common. How well they detect an object depends on:

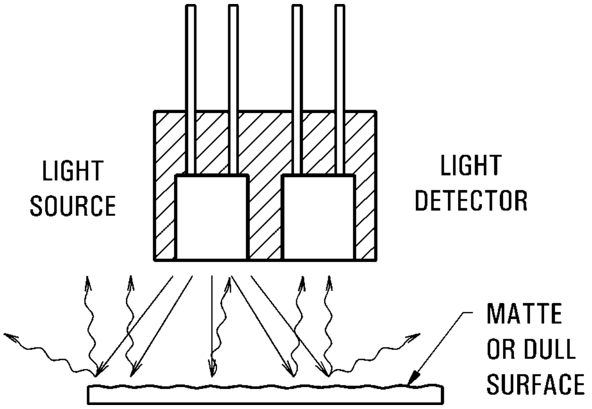
1. Amount of light emitted by the light source.
2. Sensitivity of the photodetector.
3. Distance between the switch and the object being sensed.
4. The light reflecting properties of the object.
5. Ambient lighting conditions.
6. The perpendicularity of the reflective surface to the switch.

When the object to be sensed has a polished surface, such as aluminum foil or mylar tape, often the best type of reflective switch to use is one which is designed to take advantage of the large amount of directly reflected light. This is done by mounting the emitter and detector such that their optical centers lie along the legs of an isosceles triangle such that the angle of the incidence of the emitter is equal to the angle of reflection.

When trying to sense matte objects (which do not have a highly polished surface, such as white paper), it is often possible to use a type of reflective switch optimized for sensing diffuse reflected light. Such devices have the emitter and detector mounted parallel to each other within the switch housing.



Sensor Used with a Specular Reflectance Surface.



Sensor Used with a Diffuse Reflectance Surface.

Since triangulation is not necessary, the emitter and detector elements can be located very close to each other. This allows for a much smaller package than is usually possible for retros designed to sense specularly reflected light. A retro designed to sense diffused reflected light can be the answer when space is at a premium.